

CLAIMS

1. A luminescent phosphate phosphor glass doped with at least one trivalent rare earth cations in an amount exceeding 1 mol-% on an oxide basis, the glass comprising  $P_2O_5$ ,  $Al_2O_3$ , and 0 to 50 mol-% of at least one component selected from the group formed by alkali earth oxides, alkaline earth oxides and  $ZnO$ , and further comprising up to 4 wt.-% of at least one component selected from the group formed by  $SiO_2$ ,  $ZrO_2$ ,  $As_2O_3$ ,  $Sb_2O_3$ ,  $TiO_2$ , and  $Nb_2O_5$ , said glass having color chromaticity coordinates, x and y, and color temperature, CT, near the Plankian curve between 2700K and 7000K, expressed as a  $\Delta C$  value of less than or equal to 0.011, and a color rendering index  $> 80$ .
2. The luminescent glass of claim 1, comprising at least 3 mol-% of  $Al_2O_3$ .
3. The luminescent glass of claim 1, comprising at least 50 mol-% of  $P_2O_5$ .
4. The luminescent glass of claim 1, comprising at least 3 to 15 mol-% of  $Al_2O_3$ , and at least 50 to 75 mol-% of  $P_2O_5$ .
5. The luminescent glass of claim 1, comprising 0.5 to 35 mol-% of at least one alkali metal oxide.
6. The luminescent glass of claim 4, comprising 0.5 to 35 mol-% of at least one alkali metal oxide.

7. The luminescent glass of claim 1, wherein up to 90% of the oxygen contained within the glass is replaced by fluorine.

8. The luminescent glass of claim 1, wherein up to 10% of the oxygen contained within the glass is replaced by at least one anion different from oxygen.

9. The luminescent glass of claim 8, wherein up to 10% of the oxygen contained within the glass is replaced by at least one anion selected from the group formed by nitrogen, carbon and halides.

10. The luminescent glass of to claim 1 comprising more than 2 mol-%  $\text{RE}_2\text{O}_3$  where  $\text{RE}_2\text{O}_3$  refers to more than one trivalent rare earth oxide selected from the group formed by  $\text{La}_2\text{O}_3$ ,  $\text{Ce}_2\text{O}_3$ ,  $\text{Pr}_2\text{O}_3$ ,  $\text{Nd}_2\text{O}_3$ ,  $\text{Sm}_2\text{O}_3$ ,  $\text{Eu}_2\text{O}_3$ ,  $\text{Gd}_2\text{O}_3$ ,  $\text{Tb}_2\text{O}_3$ ,  $\text{Dy}_2\text{O}_3$ ,  $\text{Ho}_2\text{O}_3$ ,  $\text{Er}_2\text{O}_3$ ,  $\text{Tm}_2\text{O}_3$ , and  $\text{Yb}_2\text{O}_3$ .

11. The luminescent glass of claim 1 comprising more than 3 mol-%  $\text{RE}_2\text{O}_3$  where  $\text{RE}_2\text{O}_3$  refers to more than one trivalent rare earth oxide selected from the group formed by  $\text{La}_2\text{O}_3$ ,  $\text{Ce}_2\text{O}_3$ ,  $\text{Pr}_2\text{O}_3$ ,  $\text{Nd}_2\text{O}_3$ ,  $\text{Sm}_2\text{O}_3$ ,  $\text{Eu}_2\text{O}_3$ ,  $\text{Gd}_2\text{O}_3$ ,  $\text{Tb}_2\text{O}_3$ ,  $\text{Dy}_2\text{O}_3$ ,  $\text{Ho}_2\text{O}_3$ ,  $\text{Er}_2\text{O}_3$ ,  $\text{Tm}_2\text{O}_3$ , and  $\text{Yb}_2\text{O}_3$ .

12. The luminescent glass of claim 1 comprising more than 4 mol-%  $\text{RE}_2\text{O}_3$  where  $\text{RE}_2\text{O}_3$  refers to more than trivalent one rare earth oxide selected from the group formed by  $\text{La}_2\text{O}_3$ ,  $\text{Ce}_2\text{O}_3$ ,  $\text{Pr}_2\text{O}_3$ ,  $\text{Nd}_2\text{O}_3$ ,  $\text{Sm}_2\text{O}_3$ ,  $\text{Eu}_2\text{O}_3$ ,  $\text{Gd}_2\text{O}_3$ ,  $\text{Tb}_2\text{O}_3$ ,  $\text{Dy}_2\text{O}_3$ ,  $\text{Ho}_2\text{O}_3$ ,  $\text{Er}_2\text{O}_3$ ,  $\text{Tm}_2\text{O}_3$ , and  $\text{Yb}_2\text{O}_3$ .

13. The luminescent glass of claim 1 comprising at least one trivalent rare earth cation selected from the group formed by cations of Ce, Tb, Eu and Tm.

14. The luminescent glass of claim 1 comprising trivalent rare earth cations of Tb, Eu, Tm.

15. The luminescent glass of claim 1 comprising trivalent rare earth cations of Tb, Eu, Tm and Ce.

16. The luminescent glass of claim 1 comprising trivalent rare earth cations of Pr and Dy.

17. The luminescent glass of claim 1 comprising trivalent rare earth cations of Pr, Dy, Tb, Eu, Tm and Ce.

18. A cold light source device comprising a cold light source emitting within a certain spectral range and a luminescent glass according to claim 1 for converting light emitted by said cold light source into light of a different spectral range.

19. The cold light source device of claim 18, wherein said cold light source is an LED.

20. The cold light source device of claim 18, wherein said cold light source is a gas discharge lamp.

21. The cold light source device of claim 18, wherein said luminescent glass is configured for converting colored light emitted by said cold light source into white light.

22. The cold light source device of claim 18, wherein said luminescent glass is configured as a solid glass body.

23. A luminescent glass comprising a base glass doped with 0.001 to 30 wt.-% of rare earth oxides on an oxide basis, said base glass comprising 1 wt.-% of water at the most, and further comprising 1 wt.-% of  $B_2O_3$  at the most.

24. The luminescent glass of claim 23, wherein said base glass is a glass selected from the group of glasses formed by an alkaline-earth silicate glass, a lead-silicate glass (flint glass), a soda-lime glass (crown glass), an alkali-alkaline-earth silicate glass, a lanthanum oxide borate glass, a barium oxide silicate glass, a chalcogenide glass and a halide glass.

25. The luminescent glass of claim 23, wherein said base glass comprises at least one oxide of a metal selected from the group formed by heavy metals and transition metals.

26. The luminescent glass of claim 23, wherein said base glass comprises at least one oxide of a metal selected from the group formed by Bi, Te, Sb, Ge, Gd, Ga, Pb, V, Nb.

27. The luminescent glass of claim 23, wherein said base glass comprises (in wt.-%):

$P_2O_5$	>7
MgO + CaO + SrO	>1
$Al_2O_3$	>5
BaO	>5
$R_2O$	>0.1
F/ $F_2$	>10

SiO<sub>2</sub> ≥ 0  
other oxides up to 20,  
wherein R<sub>2</sub>O is an alkali oxide.

28. The luminescent glass of claim 23, wherein said base glass comprises 0.1 wt.-% of water at the most.

29. The luminescent glass of claim 28, wherein said base glass, apart from any unintended contaminants, is free of nitrides.

30. A luminescent glass comprising 0.001 to 30 wt.-% of rare earth oxides on an oxide basis, said luminescent glass comprising at least partially segregated glass regions comprising rare earth ions.

31. The luminescent glass of claim 30 wherein at least 30 % of said rare earth oxides are contained within said segregated glass regions.

32. The luminescent glass of claim 30 wherein at least 50 % of said rare earth oxides are contained within said segregated glass regions.

33. The luminescent glass of claim 30 comprising 0.1 wt.% of water at the most.

34. A luminescent glass comprising 0.001 to 30 wt.-% of rare earth oxides on an oxide basis, said luminescent glass being partially crystallized having crystalline regions, said

crystalline regions comprising at least some of said rare earth oxides contained within said glass.

35. The luminescent glass of claim 34 wherein at least 30 % of said rare earth oxides are contained within said crystalline glass regions.

36. The luminescent glass of claim 34 wherein at least 50 % of said rare earth oxides are contained within said crystalline glass regions.

37. A cold light source device comprising a cold light source emitting within a certain spectral range and a luminescent glass for converting light emitted by said cold light source into light of a different spectral range, said luminescent glass being doped with 0.001 to 30 wt.-% of rare earth oxides on an oxide basis, said luminescent glass comprising 1 wt.-% of water at the most, and further comprising 1 wt.-% of  $B_2O_3$  at the most.

38. The cold light source device of claim 37, wherein said cold light source is an LED.

39. The cold light source device of claim 37, wherein said cold light source is a gas discharge lamp.

40. The cold light source device of claim 37, wherein said luminescent glass is configured for converting colored light emitted by said cold light source into white light.

41. The cold light source device of claim 37, wherein said luminescent glass is configured as a solid glass body.

42. A cold light source device comprising a cold light source emitting within a certain spectral range and a luminescent glass for converting light emitted by said cold light source into light of a different spectral range, said luminescent glass being doped with 0.001 to 30 wt.-% of rare earth oxides on an oxide basis and comprising at least partially segregated glass regions comprising rare earth ions.

43. A cold light source device comprising a cold light source emitting within a certain spectral range and a luminescent glass for converting light emitted by said cold light source into light of a different spectral range, said luminescent glass being doped with 0.001 to 30 wt.-% of rare earth oxides on an oxide basis and comprising crystalline regions, said crystalline regions comprising at least some of said rare earth oxides contained within said glass.

44. A luminescent phosphate phosphor glass doped with at least one trivalent rare earth cation in an amount exceeding 1 mol-% on an oxide basis, the glass comprising at least 50 mol-% of  $P_2O_5$ , further comprising 3 to 15 mol-% of  $Al_2O_3$ , and 5 to 35 mol-% of alkali metal oxides and up to 25 mol-% of at least one component selected from the group formed by alkaline earth oxides and  $ZnO$ , and further comprising up to 4 wt.-% of at least one component selected from the group formed by  $SiO_2$ ,  $ZrO_2$ ,  $As_2O_3$ ,  $Sb_2O_3$ ,  $TiO_2$ , and  $Nb_2O_5$ .